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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/159,569	09/24/1998	RYOJI SUZUKI	P98.1699	5302

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EXAMINER

WHIPKEY, JASON T

ART UNIT	PAPER NUMBER
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2612

DATE MAILED: 09/04/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/159,569

Applicant(s)

SUZUKI ET AL.

Examiner

Jason T. Whipkey

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

**A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.**

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-17 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 24 September 1998 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_
- 2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 5. 6) ☐ Other: .

## DETAILED ACTION

### *Drawings*

- ✓ 1. Figure 1 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.
- ✓ 2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the reference signs "Φm" (page 15, line 14) and "69" (page 16, line 17) mentioned in the description. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

### *Specification*

- ✓ 3. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.
4. The disclosure is objected to because of the following informalities:
  - ✓ ■ The sentence on lines 17-20 of page 3 is incomprehensible.

- ✓▪ "... the dispersion of the field through occurring in the gate electrode 14a ..." (page 13, lines 22-23) is incomprehensible.

Appropriate correction is required.

### ***Claim Objections***

- ✓5. Claim 3 is objected to because its meaning is unclear. For examination purposes, the examiner will interpret "before one pixel or a horizontal scan timing" (lines 3-4) as "before one pixel is read or a horizontal scan timing begins."

Appropriate correction is required.

- ✓6. Claim 14 is objected to as failing to comply with 37 CFR 1.75(a) for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 14 recites the limitation "the reset level" and "the signal level" on line 16.

There is insufficient antecedent basis for this limitation in the claim.

- ✓7. Claim 15 is objected to as failing to comply with 37 CFR 1.75(a) for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The claim recites the limitation "vertical selection lines" on line 2. There is insufficient antecedent basis for this limitation in the claim.

- ✓ 8. Claim 16 is objected to because of the following informalities:
- "Dimensionally" on line 9 is misspelled.
  - The claim fails to comply with 37 CFR 1.75(a) because it fails to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Line 18 refers to "the vertical signal lines." However, there is insufficient antecedent basis for this limitation in the claim.
  - Additionally, the claim fails to comply with 37 CFR 1.75(a) because it recites the limitation "the reset level" and "the signal level" on line 23. There is insufficient antecedent basis for this limitation in the claim.

Appropriate correction is required.

- ✓ 9. Claim 17 is objected to as failing to comply with 37 CFR 1.75(a) for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The claim recites the limitation "vertical selection lines" on line 2. There is insufficient antecedent basis for this limitation in the claim.

***Claim Rejections - 35 USC § 112***

10. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

✓11. Claims 11-15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

✓12. Claim 11 recites the limitation "said horizontal signal line" on line 6. There is insufficient antecedent basis for this limitation in the claim.

Claims 12 and 13 are rejected because they are dependent on claim 11.

13. Claim 14 recites both a solid-state image pickup device and a method of driving the same. This claim is indefinite under 35 U.S.C. 112, second paragraph. See MPEP §2173.05(q).

Claim 15 is rejected because it is dependent on claim 14.

***Claim Rejections - 35 USC § 101***

14. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

- ✓ 15. Claims 14 and 15 are rejected under 35 U.S.C. 101 because the claim is directed to neither a process nor a machine. The claim recites *both* a solid-state image pickup device and a method of driving the same. Therefore, it does not fall into *one* of the statutory classes set forth by 35 U.S.C. 101. See MPEP §2173.05(q).

Claim 15 is rejected as being dependent on claim 14.

***Claim Rejections - 35 USC § 102***

16. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) do not apply to the examination of this application as the application being examined was not (1) filed on or after November 29, 2000, or (2) voluntarily published under 35 U.S.C. 122(b). Therefore, this application is examined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

17. Claims 1, 3-6, and 11-13 are rejected under 35 U.S.C. 102(e) as being anticipated by Sauer.

Regarding claim 1, Sauer shows in Figure 4 a two-dimensional matrix of pixels. Each pixel, shown in Figure 2, has a photodetector P11, such as a photodiode, to integrate photo-generated charge (column 5, lines 13-15). The pixel also includes a selection switch TR11 and a read-out switch TC11. Both switches read out the charge stored in photodetector 11 to a signal line (column 5, lines 24-27).

Though buffer 38 is shown to be connected to signal line 72 in Figure 4, an amplifier may also be used (column 6, lines 30-33). A separate buffer/amplifier is connected to signal line 74. The buffer/amplifier outputs an electrical signal to output signal line 30 (column 5, line 62 through column 6, line 2). Signal lines 46 and 74 have reset switches 64 and 66, respectively, for resetting the lines (column 7, lines 50-54).

Regarding claims 3 and 4, the signal lines are reset before readout from the pixels begins (column 7, lines 61-64).

Regarding claim 5, Figure 2 shows the two switches TC11 and TR11 connected in series between photodetector P11 and the signal line.

Regarding claim 6, Figure 2 shows that selection switch TR11 is on the side of the photodetector P11.

As for claim 11, switches 40 and 44 are provided between signal lines 72 and 74, respectively, and output line 30. Since switch 40, for example, is turned on by row select line 26 and resetting of the signal line 46 is performed when charges are not being output to it (column 7, lines 61-64), resetting of signal line 46 must occur when switch 40 is off. Therefore, switch 40 allows signal line 46 to reach a reset level during a reset time by not connecting the line to output signal line 40. Additionally, switch 49



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must output the signal from buffer/amplifier 38 to output signal line 40 in order for the system to be useful.

Regarding claims 12 and 13, a correlated double sampling circuit may be included (column 13, lines 50-52).

***Claim Rejections - 35 USC § 103***

18. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

19. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

20. Claims 2 and 14-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sauer in view of Gowda.

Regarding claim 2, Sauer discloses a pixel array as described in the above rejection of claim 1. However, Sauer is silent with regard to using a hole accumulation diode sensor structure.

Gowda discloses a pixel circuit for an image sensor. A photodiode 26 is shown in Figure 3B. Photodiode 26 may be a pinned photodiode (column 7, lines 9-10). Official Notice is taken that a pinned photodiode is the same as a hole accumulation diode. As described in column 7, lines 18-21, the advantage of using a pinned photodiode is that it does not need to be reset after each read. For this reason, it would have been obvious for Sauer to include a pinned photodiode as described by Gowda.

Regarding claim 14, Sauer shows in Figure 4 a two-dimensional matrix of pixels. Each pixel, shown in Figure 2, has a photodetector P11, such as a photodiode, to integrate photo-generated charge (column 5, lines 13-15). The pixel also includes a selection switch TR11 and a read-out switch TC11. Both switches read out the charge stored in photodetector 11 to a signal line (column 5, lines 24-27). A correlated double sampling circuit may also be included in the system (column 13, lines 50-52).

Sauer is silent with regard to outputting a reset level followed by a signal level and calculating the difference between the two.

Gowda discloses a pixel circuit for an image sensor that performs correlated double sampling (column 5, lines 64-67). CDS is performed by retrieving first a reset level and then a signal level from a pixel and determining the difference (column 2, lines

19-22). Both signals are output to column bus 15 (column 2, lines 19-22). The advantage to reading the reset level before reading the signal level is that the pixel may be reset immediately before the two measurements are needed, which reduces the parasitic capacitance that may be present in the signal if the pixel were reset after the signal level is read but before the reset level is read.

Regarding claim 15, Sauer discloses that output signal line 1 and output signal line 2, which are adjacent, may be enabled simultaneously (column 9, lines 11-12). Two pixels on the same output signal line may also be enabled simultaneously (column 9, lines 1-4). This process is shown in Figure 7.

Regarding claim 16, Sauer shows in Figure 4 a two-dimensional matrix of pixels with a driving system consisting of vertical shift register 48 and horizontal shift register 50. Each pixel, shown in Figure 2, has a photodetector P11, such as a photodiode, to integrate photo-generated charge (column 5, lines 13-15). The pixel also includes a selection switch TR11 and a read-out switch TC11. Both switches read out the charge stored in photodetector 11 to a signal line (column 5, lines 24-27). A correlated double sampling circuit may also be included in the system (column 13, lines 50-52).

Sauer is silent with regard to using an optical system. However, the advantage to using an optical system with an imager is that images from a distance may be captured with great detail. For this reason, it would have been obvious to have Sauer's pixel matrix include an optical system.

Sauer is silent with regard to outputting a reset level followed by a signal level and calculating the difference between the two.

Gowda discloses a pixel circuit for an image sensor that performs correlated double sampling (column 5, lines 64-67). CDS is performed by retrieving first a reset level and then a signal level from a pixel and determining the difference (column 2, lines 19-22). Both signals are output to column bus 15 (column 2, lines 19-22). The advantage to reading the reset level before reading the signal level is that the pixel may be reset immediately before the two measurements are needed, which reduces the parasitic capacitance that may be present in the signal if the pixel were reset after the signal level is read but before the reset level is read.

Regarding claim 17, Sauer discloses that output signal line 1 and output signal line 2, which are adjacent, may be enabled simultaneously (column 9, lines 11-12). Two pixels on the same output signal line may also be enabled simultaneously (column 9, lines 1-4). This process is shown in Figure 7.

21. Claims 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sauer in view of Takemoto.

Claim 7 may be treated like claim 1. Additionally, Sauer shows in Figure 2 that MOS transistors are used. However, Sauer is silent with regard to using transistors with a double-gate structure.

Takemoto discloses an imaging device that uses a MOST (shown in Figure 6A) with gates 68 and 69 (column 5, lines 2-4). As defined in column 1, lines 7-8, a MOST is an insulated-gate field-effect transistor. Official Notice is taken that an insulated-gate field-effect transistor is the same as a MOS transistor.

The advantage to using a double-gate MOS transistor as opposed to single-gate MOS transistors is that switching may be performed more quickly. For this reason, it would have been obvious for Sauer to include double-gate MOS transistors in his pixel sensor.

Regarding claim 8, Takemoto shows in Figure 6A that gates 68 and 69 overlap. The advantage to using overlapping gates is that the transistor uses less space on a chip. For this reason, it would have been obvious for Sauer to include double-gate MOS transistors with overlapping gates.

22. Claims 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sauer in view of Tronnamuchai.

Claim 9 may be treated like claim 1. However, Sauer is silent with regard to connecting the read-out switch between the photodetector and the signal line and connecting the selection switch to a control electrode of the read-out switch and a read-out pulse line.

Tronnamuchai shows an image sensor in Drawing 1 with a read-out MOS S1 connected between photodiode D and vertical output line DL1. MOS S2 is connected to the control electrode of S1 and address line X1. As stated on page 13, lines 17-19 of the provided machine translation, the advantage to this transistor configuration is that random pixel access becomes possible. For this reason, it would have been obvious for Sauer's pixel matrix to utilize the transistor configuration taught by Tronnamuchai.

Regarding claim 10, both Sauer and Tronnamuchai are silent with regard to using a depression MOS transistor as the selection switch.

An advantage to using a depression-type MOSFET is that a lower voltage is needed across the source and drain. For this reason, it would have been obvious to have Sauer's selection switch use a depression-type MOSFET.

### ***Conclusion***

23. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

24. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason T. Whipkey, whose telephone number is (703) 305-1819. The examiner can normally be reached Monday through Friday from 8 A.M. to 5:30 P.M. eastern daylight time, alternating Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wendy R. Garber, can be reached on (703) 305-4929. The fax phone number for the organization where this application or proceeding is assigned are (703) 872-9314 for both regular communication and After Final communication.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Technology Center 2600 Customer Service Office, whose telephone number is (703) 306-0377.

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Any response to this action should be mailed to:

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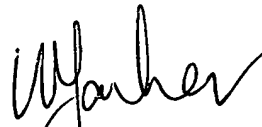
or faxed to (703) 872-9314 for either formal or informal communications intended for entry. (For informal or draft communications, please label "**PROPOSED**" or "**DRAFT**".)

Hand-delivered responses should be brought to the sixth floor receptionist of Crystal Park II, 2121 Crystal Drive in Arlington, Virginia.

JTW

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August 22, 2002



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